Repeated Visits to the Future: Asking about Mental images to Discriminate between True and False Intentions

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Abstract

In this study participants were interviewed on two occasions about a mental image of a future action. It was predicted that during an investigative interview, participants who told the truth would be more forthcoming when reporting a mental image of their future actions (such as using more words and details) compared to participants who lied about their future actions. We found that truth tellers more than liars reported to have had a mental image activated during the planning of their future actions. In addition, truth tellers used more words to describe their mental images than liars. However, no difference was found between liars and truth tellers regarding the type of details they used to describe their mental images. The subjective ratings - truthfully answered by all participants - revealed that truth tellers perceived their mental image as significantly clearer than liars. The results indicated that repeated interviews conducted on the same day are unlikely to elicit more cues to deception compared to a single interview. Future research should refine methods to more accurately pinpoint how liars and truth tellers differ in the type of details they use when describing a mental image of a claimed future intention.

Keywords

False Intentions; Deception Detection; Episodic Future Thoughts; Mental Images; Repeated Interviews; Spatial Details; Navigation

Introduction

In legal settings, it is important to accurately determine the veracity of statements provided by suspects, witnesses and alleged victims. There is a large literature on deception detection but virtually all this research is on methods discriminating between truthful and deceptive statements about *past* actions (Vrij, 2008; Granhag & Strömwall, 2004). This is remarkable considering the societal value of being able to discriminate between individuals who are either lying or telling the truth about their *intentions*. Although this topic has been acknowledged in disciplines such as economical modeling (Crawford, 2003), military (Donald & Herbig, 1981), negotiation research (Lewicki & Stark, 1996), social cognition (Beck & Ajzen, 1991), and developmental psychology (Peterson, 1995), research on true and false intentions has been virtually ignored within the field of legal psychology (Granhag, 2010). This paper concerns lying about intentions, and we define 'intention' as an agent's mental state preceding his or her corresponding action (Malle, Moses, & Baldwin, 2003). An intention, typically directed at the intender's own action, often comes with a strong commitment, and many times the intention is based on some amount of planning.

The first study on lying about intentions was conducted by Vrij, Granhag, Mann and Leal (2011), and was carried out at an international airport in the UK. The study showed that passengers who lied about their forthcoming trip came up with statements that were less plausible than, but equally detailed as, statements from passengers who were truthful about their forthcoming trip. In the second study the same team of researchers had serving military and police officers acting as undercover agents, each of them meeting both hostile and friendly agents (Vrij, Leal, Mann, & Granhag, 2011). The study showed that false intentions and lies about past actions were less plausible than their truthful counterparts. There was no difference in terms of details comparing truthful with deceptive intentions. Hence, this result replicated the findings by Vrij, Granhag, Mann and Leal (2011).

The focus of the present study is on how liars and truth tellers remember and report mental images during an investigative interview, images which they report to have had activated when planning their future action. Furthermore, this study is the first to test the effect of repeated interviews conducted on the

same day on how people describe their mental images. In addition, it is also the first study to examine which type of details is used in these descriptions.

Episodic Future Thoughts

Episodic future thoughts (EFTs) play an important role when individuals mentally simulate future scenarios (Markman, Klein, & Suhr, 2009; Schacter, Addis, & Buckner, 2008). It relates closely to the concept of the 'prospective brain', the idea that a crucial function of the brain is to use stored information to simulate, imagine and predict possible future events (Schacter, Addis, & Buckner, 2007). In other words, EFTs can be viewed as the ability to 'pre-experience' the future (Tulving, 1983). The building blocks from which EFTs are constructed come from people's episodic memory, as supported by both developmental (Atance & O'Neill, 2001) and neuroimaging studies (Buckner & Carroll, 2007; Schacter, et al., 2007).

A crucial observation obtained from research is that EFTs are often accompanied by the formation of one (or several) concrete mental images which are part of the constructive process of EFTs (Johnson, Foley, Suengas, & Raye, 1988; Sanna, Schwarz, & Kennedy, 2009).

Neuroimaging studies suggest that EFTs are associated with an act of self-projection (i.e., a shift in perspective from the immediate present to alternative perspectives) comprising navigation (i.e., way-finding; Buckner & Carroll, 2007) and/or scene construction (i.e., the process of mentally generating and maintaining a complex and coherent scene or event) comprising spatial context (Hassabis & Maguire, 2007). For example, when thinking about an upcoming birthday-party, colorful images may appear in the mind. These mental images often contain various details and actions. Hence, someone might 'see' him/herself moving around in the room, taking a glass, tasting the wine, interacting with people, and perhaps even feeling emotions.

Using EFTs to Study True and False Intentions

Granhag and Knieps (2011) conducted the first EFT-driven study on true and false intentions. In their study one group of participants (truth tellers) was asked to plan a visit to a shopping mall to buy a gift for a close friend (i.e., to carry out a non-criminal act); while liars were asked to individually plan a mock-criminal act (to place a memory stick containing illegal material in a store in the same shopping mall). These participants were also asked to plan a cover-story on buying a gift for a close friend to be used if stopped and questioned. Before leaving for the mall, all participants were intercepted and interviewed about their intentions and their planning activities. The liars used their cover-stories during the interview to try to mask their criminal intentions while the truth tellers told the truth. A significantly higher proportion of truth-telling than lying suspects agreed during the investigative interview that they had evoked a mental image while planning their future actions. In addition, lying suspects who claimed to have activated a mental image during the planning phase, provided significantly poorer verbal descriptions of their most dominant mental image than truth tellers. Participants' subjective ratings on how they remembered the construction of EFT (measured in a Post-Interview Questionnaire which all participants answered truthfully) revealed further differences. Truth tellers more compared to liars remembered their planning as being characterized with the activation of mental images, and truth tellers reported this memory to be much clearer than liars. Finally, liars perceived the question on the mental image as significantly more difficult to answer compared to truth tellers.

In a second study, the authors tested how liars and truth tellers differ in describing their mental image when being interviewed repeatedly (Knieps, Granhag, & Vrij, unpublished). The planning phase was identical to the one employed by Granhag and Knieps (2011). However, after the first interview, all participants left and were asked to come back one week later. At the second meeting they were interviewed again with respect to their mental images. Taking both interviews into consideration, it was revealed that truth tellers reported to have had a mental image activated during the planning of their intentions more often than liars. However, liars' and truth tellers' descriptions on their mental image did not differ from each other in terms of number of words or amount of details. In addition, the reports of liars were less consistent over time. The subjective ratings provided by the Post-Interview Questionnaire showed that liars perceived the 'time of the day' significantly clearer than truth tellers. In general, liars and truth tellers were found to differ in fewer aspects of the mental in comparison to previous studies (Granhag & Knieps, 2011). . It was argued that it might have been caused by the large time delay

between the construction of EFT (and a mental image) and its reconstruction from memory in the rating (Knieps, et al., unpublished).

In sum, both studies (Granhag & Knieps, 2011; Knieps, et al., unpublished) provided strong support for the assumption that EFT features, such as the mental image, can be helpful to discriminate between true and false intentions. The processes relevant for constructing a cover-story, in which a liar needs to mask his/her criminal intentions, were much less characterized by a vivid mental image.

The Present Study

The present study had three goals. Firstly, we were interested in how repeated interviews conducted on the same day affect the way participants remember and report a mental image they have had at a specific point in time. Secondly, learn about the type of details liars and truth tellers use when describing their mental images. As suggested by neuroimaging studies (Buckner & Carroll, 2007; Hassabis & Maguire, 2007) EFTs may be reflected in descriptions on navigating the 'self' through the scene, visual details and spatial details. These details can be assumed to be more vivid and clear for true intentions compared to false intentions. To our knowledge, this is the first study to examine the content of the description on true and false intentions. Thirdly, we aimed at replicating the results that truth tellers report mental images more often during an investigative interview than liars (Granhag & Knieps, 2011; Knieps, et al., unpublished).

The experimental set-up used for the present study was similar to the one introduced by Granhag and Knieps (2011). Liars were requested to plan a mock criminal act (placing a memory stick containing illegal material on a particular shelf in a shop in a mall), and were also asked to plan a cover-story on buying a gift for a close friend. This story was to be used to mask their criminal intentions if stopped and questioned. Truth tellers were requested to plan buying gifts for a close friend in the same mall. The mental image of the future was tapped in two different ways. First of all, all participants were asked which image came up in their mind when they planned their activity. All participants were interviewed repeatedly concerning their mental images. In contrast to Knieps et al. (unpublished), in the present study all participants were questioned about their mental images at two different occasions on the same day. Repeated interviewing is a common

procedure in real life (Granhag & Strömwall, 1999). The mental image of the future was also measured in a Post-Interview Questionnaire (PIQ) in which all participants were asked to rate their subjective perception of the mental image they reported.

With reference to the EFT-framework (Szpunar, 2010) and previous empirical results (Granhag & Knieps, 2011; Knieps, et al., unpublished), it was predicted that more truth tellers than liars will report that they had a mental image activated when planning their stated future actions (Hypothesis 1). Regarding the type of details used when describing a mental image, it was predicted that truth tellers (vs. liars) will use more visual details (i.e., what the speaker sees), spatial details (details about where things are arranged in space) and descriptions on navigating the 'self' through that scene (how people move from one place to another) (Hypothesis 2). This is based on the notion that EFTs are associated with navigation (Buckner & Carroll, 2007) and spatial context (Hassabis & Maguire, 2007) suggesting that these aspects may play a role in the processes involved when forming a mental image. In addition, it was also expected that the dominant mental image described by truth tellers will contain more words than that described by liars (Hypothesis 3). Furthermore, research showed that lying during an interview is often more cognitively demanding than telling the truth (Vrij, Fisher, Mann, & Leal, 2006). Hence, we predicted that liars will perceive the question on the mental image as more difficult to answer compared to truth tellers (Hypothesis 4). With respect to the post-interview questionnaire, it was expected (a) that truth tellers' will perceive the planning of their future actions as being more characterized with the activation of mental images in contrast to liars' planning of their cover-stories, and (b) that truth tellers will pre-experience their future actions more clearly than how liars will pre-experience their cover-stories (Hypothesis 5a). With respect to the more specific ratings of the mental image, we predicted that truth tellers will perceive their mental image clearer and richer in details than liars (Hypothesis 5b). This is in line with our assumption that details of the mental image are more vivid and clear for true intentions compared to false intentions.

Method

Design

In total, 60 subjects (45 women, 15 men) took part in the experiment, whose age ranged from 19 to 50 years

(M = 26.12), and all were paid 160 SEK for their participation (approximately 25 USD). The participants were randomly assigned to either the truth teller or liar-condition. A 2 (Intent: True vs. False) x 2 (Time: Interview 1 vs. Interview 2) mixed-group design was employed with half of the participants being instructed to plan a mock crime (N = 30), and half of the participants being instructed to plan a non-criminal event (N = 30).

Procedure

Planning phase. The liars planned to place a memory-stick containing 'illegal' material on a particular shelf in a shop in a shopping mall. A second task for the liars was to plan a cover-story with the main theme 'shopping two gifts in the mall' to mask their criminal intentions. This story was to be used if they were intercepted. In other words, we provided a 'frame' for the cover-story which was similar to the truthful mission, but we also made it clear that it was up to each participant to fill this frame to construct a convincing cover-story. By comparison, the truth tellers were instructed to purchase two gifts in the same shopping mall. All participants given 25 minutes to plan for their tasks, were instructed to carefully plan their future actions and given access to printed maps of the city center, the shopping mall, and the internet (this particular shopping mall has its own website, containing detailed information on all shops in the mall). Moreover, the participants were further motivated by a number of explicit constraints; they were instructed that they had one and only one opportunity to carry out the task, and that they had a very limited amount of time at their disposal. Thus, a set-up encouraging the participants to envisage themselves was utilized acting at a particular time and place in the very near future. After the planning phase, the experimenter checked that all participants did indeed believe that they next were to execute their planned actions. This was a crucial prerequisite of the current study to achieve ecological validity.

Interviews. All participants were individually interviewed about their mental image at two different occasions within approximately 1.5 hours. None of them knew in advance how many times they were going to be interviewed. The interviews were audio-taped and the interviewers were blind to the participants' truth status. Interview 1: Immediately after the planning phase, each participant was brought to a nearby room where they expected to receive the tram-tickets to go to the mall. However, immediately after entering this room they were intercepted. The experimenter gave them a list of instructions asking them to imagine that they now had faced a security check at the entrance of the shopping mall, and that - when trying to pass this security check - they had been selected for further questioning. Before leaving the room, the experimenter made sure that the participant understood the instruction and instructed the liars to use their cover-story to avoid making their criminal intention being exposed. Moreover, they were informed that the interviewer did not know whether they were lying or telling the truth. The truth tellers who planned to shop in the mall were asked to tell the truth about their intentions. All participants, instructed to try to be as convincing as possible, were individually interviewed with a structured interview protocol asking about their intentions, planning activities and the occurrence of a mental image during planning. Each interview contained two blocks of questions: (a) questions on their intentions at the shopping mall, (b) questions on their planning activities for the shopping mall. The block on their planning activities included also the question on the occurrence of the mental image during planning. An example of a critical question on their intentions was "Please tell me in as much detail as possible what you intended to do in the shopping mall! Please tell me about every step!" An example of a critical question on the planning-phase was "Tell me as detailed as possible, how you planned your visit to the shopping mall!" An example of a critical question on the mental image was "Tell me as detailed as possible about your mental image that you might have "seen" or "visualized" when you planned your future action!" After the interview, the suspect was left alone in the room, and s/he was not instructed about what was next. Interview 2: After about 10 minutes, the same interviewer returned to conduct the next interview. As in interview 1, the participants were asked questions concerning their intentions, planning activities and the occurrence of a mental image during planning. The interview protocol used was, to its structure, similar to the protocol used for the first interview. However, the relevant question on the occurrence of the mental image was identical.

Post-Interview Questionnaire (PIQ). Immediately after interview 2, participants were asked to complete a Post-Interview Questionnaire. Liars were explicitly instructed to answer this questionnaire truthfully and

to stop role-playing, and the experimenter checked that this instruction was fully understood. To begin with, participants rated the degree of veracity of what s/he had stated during the interview on a 7-point scale running from 1 (everything I told was true) to 7 (everything I told was untrue). Next, participants were asked to rate some basic features of the planning phase as well as how difficult they experienced the planning on a 7- point scale ranging from 1 (very easy) to 7 (very difficult); how sufficient they found the time allocated for the planning phase on a scale ranging from 1 (not at all sufficient) to 7 (totally sufficient); and how satisfied they were with the planning and how stimulating and interesting they found the planning. For the latter two questions 7-point scales were used ranging from 1 (not at all satisfied/stimulating) to 7 (very satisfied/stimulating).

Before starting to complete the next section of the PIQ, the truth tellers were asked to "Think back to your planning.", whereas the liars were instructed to "Think back to the planning of your cover-story." This section contained 10 questions related to EFTs. Participants rated these questions on 7-point scales ranging from 1 (to a very low extent) to 7 (to a very high extent). The first question was "To what extent did you form a mental image while planning your errand [cover-story]?" Next followed a set of questions based on the 'Memory Characteristics Questionnaire' (MCQ) which, in turn, has been derived from the reality-monitoring framework (Johnson & Raye, 1981). This questionnaire has previously been applied to map the subjective perceptions during pre-experiencing the future (D'Argembeau & van der Linden, 2004; Szpunar & McDermott, 2009). In total, there were eight questions covering the participants' subjective experiences of the dominant mental image activated during the planning phase. Specifically, three questions covered sensorial information (the degree to which the mental image was characterized by (i) visual information, (ii) auditory information and (iii) smell/ taste information); as well as spatial information (the extent to which the mental image was characterized by clarity with respect to (i) the spatial location per se, (ii) the spatial location of objects and (iii) the spatial location of persons), and, finally two questions covered temporal information (the extent to which the mental image was characterized by clarity with respect to the time of the day and the temporal order of the event). Furthermore, the participants answered the following question "To sum up, how clearly did you pre-experience the future event?" (truth tellers), and "To sum up, how clearly did you pre-experience your cover-story?" (liars). The 7-point scale used to answer this question ranged from 1 (to a very low degree/no strong feeling of having pre-experienced) to 7 (to a very high degree/a very strong feeling of having pre-experienced).

In the final section, participants were asked to rate to what extent they anticipated that the main EFT-question would be asked during the interview. The 7-point scale used to answer this question ranged from 1 (very anticipated) to 7 (not at all anticipated). In addition, all participants were asked to rate how difficult they found answering this question on a 7-point scale ranging from 1 (not at all difficult) to 7 (very difficult).

Coding. All interviews were transcribed verbatim. To test Hypothesis 1, the answers given to the question "At any point during your planning, did you evoke a mental image of the future event?" were coded ("Yes, a mental image was evoked." vs. "No, a mental image was not evoked."). To test Hypothesis 2, two coders (one coded 100 % of the material and the other one 20%) were asked to assign the details which the participants described during the interviews to three different groups (1) descriptions on navigating the "self" through that scene (moving how) (2) visual details (what), and (3) spatial details (where). They agreed on this classification in 80.1 % of the cases. Moreover, to test Hypothesis 3, a computer-based word-count was conducted to count the number of words participants used to describe their most dominant mental image (any new details told in response to the follow-up question were added to the original response). No additional coding was needed for the post-interview ratings (Hypothesis 4 and 5).

Results

Manipulation Checks

Veracity. Liars (M = 4.97, SD = 1.69) rated the degree of lying significantly higher than truth tellers (M = 2.03, SD = 1.54), t(58) = -7.02, p = .046, d = -1.82, which means that the participants followed our instruction to lie or tell the truth.

Experience of the planning-phase. Liars (M = 6.40, SD = 1.07) were significantly more satisfied with the time allocated to plan their future action compared to truth tellers (M = 5.27, SD = 1.84), t(47) = -2.92, p = .005, d = -0.75. One should note, however, that both liars and

truth tellers found that they had sufficient time to plan as the means for both groups were at the upper end of the scale. Liars (M = 5.03, SD = 1.54) and truth tellers (M = 4.63, SD = 1.77) perceived the planning as equally stimulating, t(58) = -0.93, p = .36, d = -0.24. Furthermore, liars (M = 5.77, SD = 0.90) and truth tellers (M = 5.80, SD = .96, t(58) = 0.14, p = .89, d = 0.03) were equally satisfied with their planning. In the same vein, no difference emerged between liars (M = 2.63, SD = 1.13) and truth tellers (M = 3.13, SD = 1.61) with respect to the perceived degree of difficulty of the planning, t(52) = 1.39, p = .17, d = 0.36). These ratings were on the lower range of the scale, indicating that both liars and truth tellers experienced the planning as rather easy.

Objective Measures of the Mental Image (Interview)

Reporting a mental image during the interview. Significantly more truth tellers than liars reported a mental image, which was found both in interview 1 (truth tellers: 29 of 30 (96.7%); liars: 23 of 30 (76.7%); χ^2 (N = 60) = 5.192, p = .023) and interview 2 (truth tellers: 30 of 30 (100%); liars: 25 of 30 (83.3%); χ^2 (N = 60) = 5.455, p = .020). In all, Hypothesis 1 was supported.

Of the 23 liars who in both interviews reported to have had a mental image activated, nine lied during the interview. That is, for the investigative interview, these nine individuals reported to have had a mental image activated during the planning phase, but in the Post-Interview Questionnaire (which was filled out after the role play had been called off) they admitted that they had lied about this during the interview.

Type of Details. We conducted three 2 (Veracity: Truthful vs. Deceptive) x 2 (Time: Interview 1 vs. Interview 2) mixed-group ANOVAs for the aspects (a) navigation, (b) visual details, and (c) spatial details (see Table 1). For navigation, we did not find a main effect on Time (F(1, 50) = 1.413, p = .24, η^2 = .006), or for Veracity (t(42) = 1.74, p = .089, d = 0.54), and there was no interaction effect (F(1, 50) = .088, p = .768, η^2 < .001). For visual details, we did not find a main effect on Time (F(1, 50) = 1.384, p = .245, η^2 = .005), or for Veracity (t(50) = 1.601, p = .116, d = 0.45), and there was no interaction effect (F(1, 50) = .301, p = .586, η^2 = .001). However, we found that 76% of all liars mentioned the particular shop in their cover-story which was also of relevance to their criminal intention (i.e., the shop where they were supposed to execute the criminal act). For spatial details, we did not find a

main effect on Time (F(1, 50) = .011, p = .918, η^2 < .001), or for Veracity (t(50) = .721, p = .474, d = 0.20) and again there was no interaction effect (F(1, 50) = 3.779, p = .058, η^2 = .017). Hence, Hypothesis 2 was not supported.

TABLE 1. TYPE OF DETAILS.

	Truth tellers		Liars		
	M	SD	M	SD	d
Interview 1					
Navigation	4.69	5.24	2.88	2.46	0.44
Visual detail	13.55	9.2	9.63	5.98	0.51
Spatial detail	2.86	2.6	1.75	2.03	0.48
Interview 2					
Navigation	3.93	3.81	2.62	3.11	0.38
Visual detail	11.9	6.23	9.19	8.34	0.37
Spatial detail	2.27	2.15	2.5	2.44	-0.10

* p < .05 (comparing liars and truth tellers)

Number of Words. A 2 (Veracity: Truthful vs. deceptive) x 2 (Time: Interview 1 vs. Interview 2) mixed-group ANOVA revealed main effects on both Veracity and Time. That is, truth tellers (M = 271.83, SD = 139.35) used more words to describe their mental image than liars did (M = 195.35 SD = 117.30; (t(50) = 2.11, p = .040, d = .60). Hence, Hypothesis 3 was supported. In addition, more words were used in interview 1 (M = 128.65, SD = 75.13) than in interview 2 (M = 109.35, SD = 70.20, F(1, 50) = 5.52, p = .023, η^2 = .016. However, the interaction effect was not significant, F(1, 50) = 2.46, p = .123, η^2 = .007.

Subjective Measures of the Mental Image (Post-Interview Questionnaire)

Perceived anticipation and difficulty. The self-ratings indicated that both liars (M = 5.7, SD = 1.54) and truth tellers (M = 5.17, SD = 1.39) found the question during the interviews about the mental image equally unanticipated t(58) = -1.41, p = .164, d = -0.37). The absolute values (> 5) showed that both groups found this question highly unanticipated. Furthermore, no difference was found between liars (M = 3.8, SD = 1.85) and truth tellers (M = 3.03, SD = 1.67) when asked to rate how difficult they perceived the question about the mental image, t(58) = -1.69, p = .097, d = -0.44). Hence, Hypothesis 4 was not supported.

Perceptual information. Truth tellers' planning of their future actions (M = 5.83), and liars' planning of their cover-stories (M = 5.31), did not differ in terms of the extent of activation of mental images, t(16) = .894, p = .385, d = 0.45 (See Table 2). In addition, no difference was found between liars (M = 5.13) and truth tellers (M = 5.63) on how clear these images were, t(43) = .994,

p = .326, d = 0.30. Hypothesis 5a, therefore, received no support.

Regarding participants' specific perceptions of the main mental image that they had activated (Hypothesis 5b), it was found that truth tellers (M = 6.30) saw the mental image significantly clearer than liars (M = 5.47), t(43) = 2.13, p = .039, d = 0.65. The means at the upper range of the scale indicated that the vision was clear for both groups. On the contrary, both groups rated the clarity of sound and smell/taste at the lower range of the scale, indicating that

TABLE 2. LIARS' AND TRUTH TELLERS' SUBJECTIVE PERCEPTIONS

| Subjective ratings | Truth tellers | | Liars | | |
	M	SD	M	SD	d
Global					
Extent, mental image	5.83	1.18	5.31	1.97	0.32
Clarity, pre-experience	5.63	1.52	5.13	1.73	0.31
Specific					
Visual	6.30*	1.15	5.47	1.41	0.65
Auditory	2.57*	1.85	1.60	.80	0.68
Smell/taste	2.17*	1.70	1.27	1.37	0.58
Location	5.43*	1.41	4.47	1.69	0.62
Position of other objects	5.90*	1.50	4.80	1.74	0.68
Position of other people	2.77	1.81	2.93	1.75	-0.09
Time of day	2.97	1.94	2.73	1.67	0.13
Temporal order	5.07	1.87	4.07	2.05	0.51

* p < .05. Note that all ratings for the liars pertain to how they perceived their cover-story.

their mental images were barely characterized by these two aspects. However, these aspects in the mental image were rated as significantly less clear by liars than by truth tellers, with respect to both sound, t(42) = 2.49, p = .01, d = 0.77, and smell/taste, t(43) = 2.41, p = .020, d = 0.74. Furthermore, both the spatial information regarding the spatial location (truth tellers: M = 5.43; liars: M = 4.47, t(43) = 2.03, p = .048, d = 0.62) and position of other objects (truth tellers: M = 5.90; liars: M = 4.80, t(43) = 2.20, p = .033, d = 0.67), were perceived as clearer by truth tellers compared to liars. Hence, we found support for Hypothesis 5b.

Discussion

The main purpose of this study was to test the assumption that reports about mental images may give us a better understanding on how to discriminate between individuals who are lying and individuals who are telling the truth about their intentions.

Main Findings

Planning. Analyzing the self-reports made in the Post-Interview Questionnaire on basic features of the planning-phase, we found that liars were significantly more satisfied with the time allocated for the planning-phase than truth tellers. However, and importantly, the means showed that both groups of suspects found the time allocated for the planning phase sufficient. No difference was found in how satisfied liars and truth tellers were with their planning. Finally, we found that liars and truth tellers did not differ with respect to (a) how stimulating and (b) how difficult they found the planning to be. In fact, both groups indicated that they experienced the planning as a rather easy, but still stimulating, task.

Reports of a mental image. Truth tellers reported that they had evoked a mental image while planning their future actions more often than liars. Both interviews showed that (almost) all of the innocent suspects (interview 1: 96.7%; interview 2: 100%) claimed to have had activated a mental image while planning their actions. In contrast, significantly fewer guilty suspects made the same claim (interview 1: 76.7%; interview 2: 83.3%). This finding supported our hypothesis and replicated previous findings (Granhag & Knieps, 2011; Knieps, et al., unpublished).

Type of details. The data did not reveal significant differences between liars and truth tellers for descriptions on navigating the 'self' through that scene, and not for visual details, and spatial details. An interesting finding is that the majority of liars stayed close to the truth in their cover-story. More specifically, 76% of the liars used the same specific shops in their cover-story which was also of relevance to their true criminal intention. Research has shown that liars, when given the opportunity, will often embed their lies in truthful statements (Leins, Fisher, & Ross, in press; Roach, 2010; Vrij, 2008). This may explain why no differences in details were found between truth tellers and liars. The fact that liars embed their lies in truthful statements is an interesting finding as it means that liars do in fact reveal details of their future intentions during an interview. The challenge for lie-catchers is to identify these crime-relevant details from crime-irrelevant details. Of course, an alternative explanation for the absence of a difference in describing the content of

the mental images is that our coding methods did not capture differences which may have been present. For example, we counted all details but did not control for repetitions. This calls for more sophisticated methods to assess the content of the descriptions.

Number of words. Truth tellers used more words over the two interviews to describe their mental images than liars. This is in line with previous research showing that truth tellers and liars differed in their principal verbal strategies. As a result, liars try to keep their story simple while truth tellers try to tell it like it was (Strömwall, Hartwig, & Granhag, 2006). In addition, more words were used in interview 1 than in interview 2. This is not surprising as interview 2 was conducted shortly after interview 1 on the same day. Hence, it is unlikely that people add significantly more information after such a short time delay. However, longer time delays may generate more new information (Knieps, et al., unpublished).

Perceived anticipation and difficulty. The ratings in the Post-Interview Questionnaire following right after the second interview revealed no differences between truth tellers and liars with respect to how difficult they perceived the question about the mental image and how much they anticipated this question. In comparison, previous research showed that liars usually rated the question on mental images as significantly more difficult than truth tellers (Knieps, et al., unpublished). However, in the present study liars answered this question on two different occasions. It is likely that the second interview was remembered as less difficult for liars as they could simply repeat what they have said in the previous one. Even though we asked all participants to think back of when they got the question in the first interview and rate how difficult they had perceived it then, liars' memory might have been affected more by how they remembered the second interview. It should be noted that the difference between liars and truth tellers was bordering on significance.

Perceptual aspects. The self-reports indicated that truth tellers' planning of their future actions was characterized by the activation of mental images to the same extent as liars' planning of their cover-stories. Furthermore, truth tellers did not pre-experience their future actions as clearer compared to how liars pre-experienced their cover-stories. Hence, we did not find support for Hypothesis 5a. In other words, we were not able to replicate the finding reported by Granhag and Knieps

(2011). The findings of the present study were, however, in line with the results reported by Knieps, et al. (unpublished) as their data did not reveal differences for global ratings either. The specific ratings of the mental image revealed clear differences between liars' and truth tellers' perceptions regarding sensorial (vision, sound, smell/taste) and spatial (position of other objects) aspects of their mental images. This is, however, in contrast with previous findings (Granhag & Knieps, 2011; Knieps, et al., unpublished) which revealed no such differences. Furthermore, truth tellers in the present study perceived the location as significantly clearer than liars. This finding was in line with the results reported by Knieps et al. (unpublished) but in contrast to Granhag and Knieps (2011). In sum, despite of the inconsistency over different studies regarding perceptual aspects, a general pattern is shown: truth tellers perceive the mental image and its different aspects as clearer than liars. This suggests that there is an effect on the clarity of mental images but that our Post-Interview Questionnaire is not sufficiently capable to capture these differences in the most accurate way.

Limitations

This study comes with a number of limitations, and below we will acknowledge three of these. First of all, an intention may come without any mental images (e.g., the formation of an intention on a script-like routine activity like doing the dishes may very well come without any mental images). Therefore, the applied value of the current study is limited to situations where the intender is likely to have planned his or her actions (e.g., buying a weapon, departure from an airport, signing up for specialist training), an activity which is known to evoke mental images. Second, and in a similar vein, many intentions that people form are only loosely (if at all) tied to an exact time and place in the future. For the present study both the legal and illegal intentions formed were clearly positioned in terms of time and place: They were related to a single act, to be performed in the very near future, and at a specific time and place. The results of the current examination can only be generalized to such situations. Third, we used a number of different measures to map mental images, however, only what suspects report during the actual interview is of value in an applied context. The reasons why our participants were asked questions about their perceptions of their mental

images in a Post-Interview Questionnaire was to learn more about the trademarks of the mental images activated during the planning-phase.

Future Research

We have two suggestions for future research. First, it is worthwhile to refine the method to analyze the content of descriptions regarding the mental images. When people describe what they remember they often blend their memory with cognitive processes like evaluations or justifications. As a result, the descriptions may also contain non-descriptive details, but we have not examined these. An alternative is to ask questions that encourage interviewees to include more descriptive details. For example, if people are asked to describe a mental representation in the 3rd person, they tend to include more descriptive details and fewer reflective details (Haug, 1987; Crawford, Kippax, Onyx, Gault, & Benton, 1992). Second, the inconsistent findings derived from the Post-Interview Questionnaire indicate that the ratings cannot fully capture how an individual perceives the mental images. As a consequence, we might miss out on certain relevant trademarks by using questionnaires only. For example, the questionnaire used so far did not ask about the point in time a mental image may have been formed (e.g., during the planning phase, or during the interview when being asked about it) and its characteristics (e.g., clarity, vividness and possible other features). These questions should be addressed in future research.

Final Reflection

We asked our participants to repeatedly visit the future by asking them on two different interview occasions to remember the mental image they may have evoked during constructing EFTs. It is questionable whether repeated interviews with similar questions conducted that briefly after each other will elicit cues to deception (such as consistency between statements) helping to distinguish between liars and truth tellers. This is supported by our finding that there were only few differences between the first and the second interview in the present study.

Furthermore and in contrast to our prediction, we did not find any differences between liars and truth tellers regarding the details they use when describing their mental images. This is odd regarding the finding that liars and truth tellers differ in the number of words they use in these descriptions. As the number of words and the number of details are usually related, one would expect similar findings for both variables. This suggests that the details that were not coded for may have caused this difference.

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